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ABSTRACT

Two tests of morphological ability, the Berry-Talbott Test and the Grammatic Closure Test of the Illinois Test of Psycholinguistic Abilities were administered to 20 good readers and 20 dyslexics (all second grade males). The results indicated that the dyslexics were inferior to the good readers on both measures and that on the Berry-Talbott Test the complex items accounted for most of the difference between the sample groups. Results suggested the use of these two measures to identify children experiencing difficulty in generating and mastering the morphological rules and the use of results of item analysis in a language therapy program. (Author/DB)

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ASSESSMENT OF MORPHOLOGICAL ABILITY IN GOOD AND POOR READERS

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Assessment of Morphological Ability in Good and Poor Readers

Abstract: Two tests of morphological ability, the Berry-Talbott Test (Berry, 1966) and the Grammatic Closure Test of the Illinois Test of Psycholinguistic Abilities (Kirk, McCarthy and Kirk, 1968) were administered to twenty good readers and twenty dyslexics. The results indicated that the dyslexics were inferior to the good readers on both measures and that on the Berry-Talbott Test the complex items accounted for most of the difference between the sample groups. These two measures might be useful in identifying children experiencing difficulty in generating and mastering the morphological rules. In addition, an item analysis may provide valuable information for the language therapist.

Teachers of reading should also be alert to the possibility that poor readers may be deficient in morphological ability which in turn may result in an inefficient use of the semantic and syntactic clues provided in the morphology of written language. Through oral language instruction such children may be helped to internalize complex morphological structures.

Morphological Ability in Normal and Dyslexic Children

Morphology is the study of the rules for combining the smallest units of meaning, called morphemes, into words. There are two kinds of morphemes, free and bound. Free morphemes can occur alone and as such were not of concern in this investigation. Assessment of morphological ability was limited to bound morphemes, i.e., morphemes attached to other morphemes. There are also two kinds of bound morphemes; one type alters the meaning of a word, e.g., plural -s, while the other expresses a relationship between two words, e.g., possessive -s (Cazden, 1972).

REVIEW OF LITERATURE

Berko (1958) found evidence that children learn a set of morphological rules, in addition to phonological, semantic and syntactic rules, which enables them to inflect words, even those which they may never have heard spoken. These rules are based on the most consistent and regular features of the English language. Children internalize a set of rules which gradually approximates adult rules. Although the burden of any message in English is conveyed mainly by the word order of a sentence, inflections provide both semantic information (number and tense) and grammatical information (marking a word as a member of a grammatical class).

In the developmental sequence of language learning, syntax precedes morphology. Ervin and Miller found that inflectional markers do not appear until after the child's third birthday, but by five most children have mastered inflectional rules for regular forms (Berko, 1961; Ervin and Miller, 1963). In studying morphological development in the child between the ages of five and eight, it was found that learning continues after the age of five

and that performance improves year by year, especially with regard to the irregular morphemes of plural and past tense (Chappel, 1968 in Brittain, 1970). The pattern of mastery, in addition to progressing from regular to irregular morphemes, begins with those morphemes which involve the addition of a single sound, to those which require the addition of a syllable at the end, and then finally to those rules which apply to an internal vowel shift (Berko, 1958; Templin, 1957). In the process of mastering a specific morphological rule, the ability to use that rule to inflect a nonsense word is the final stage in the developmental process (Ervin-Tripp, 1966).

Brittain (1970), replicated the Berko (1958) study in first and second grade boys and girls and then correlated inflectional performance with reading ability. For first and second grade boys and girls the correlations were significant, but the correlation for second grades was significantly higher than for those in first grade (.71 which is significant at the .001 level as opposed to .41 which is significant at the .01 level). This finding was interpreted as indicative of the increased number of inflected forms in second grade reading material. In addition, it was suggested that a child of seven or eight who has not yet mastered the morphological rules of his language, may be experiencing a linguistic retardation which is hampering his progress in learning to read (Brittain, 1970).

Children with reading disability whose primary difficulty was in decoding, not in reading comprehension, were given the Illinois Test of Psycholinguistic Abilities (Hepburn, 1968; Hyatt, 1968; Kass, 1966; Kirk, McCarthy and Kirk, 1968). The children studied were between the ages of seven and nine and in grades two through four. In Kass's study 21 reading disability children showed a marginal deficit on the Grammatic Closure subtest when com-

pared with normative data. In Hyatt's (1968) follow-up study this deficit was not apparent at the end of second grade. Conflicting findings in 100 third graders who were divided into two groups based on reading ability were reported by Hepburn (1968). She reported that the group of poor readers was significantly different from the good readers in Grammatic Closure.

These results seem to indicate that morphological ability may be of considerable importance in learning to read especially after the beginning stage when written language includes an increased number of inflected words. Moreover, they also seem to indicate that one possible correlate of reading difficulty is a deficiency in morphological ability.

PURPOSE

The following is an in-depth report and reanalysis of data which was part of a larger investigation by Vogel (1974) in which morphological ability was assessed in two groups of children, good readers and dyslexics with reading comprehension difficulties.

The purpose of this part of the study was to determine if dyslexics are significantly different from good readers in morphological ability. Because no scoring key was available for the Berry-Talbott, one was devised based on Berko's study and the rules of morphology for standard English (Berko, 1957; Vogel, in press). A revised scoring key has since been developed based on an analysis of the children's responses and on normative data from approximately 42 adults. This scoring key was used in the reanalysis of data reported below and is to be found in Table 1 as it may prove useful to other research workers and language therapists.

METHODS AND PROCEDURES

Measurement of Abilities

In order to determine if the dyslexics were significantly different from the good readers in morphological ability, two tests were selected: one employing nonsense words, the other employing real words. In both measures the channel of input was both auditory and visual since a picture was presented along with an incomplete sentence. Neither of the measures required that the child read or write. There was no penalty for articulatory distortions which were consistent with the child's general speech habits.

Morphology for Nonsense Words

Berko devised a test using nonsense words to investigate the child's knowledge of morphological rules (Berko, 1957; Gleason, 1969). The rationale for using nonsense words rather than real words was to enable the examiner to be certain that the task required use of morphological rules and not just exposure, memory, and imitation. A correct response indicated that the child had mastered adult morphological rules. The choice of test items was based on the vocabulary of first grade children and a frequency inventory of morphological features which was then used to rate these features as to level of difficulty. Berry's adaptation of Berko's test was used in this investigation (Berry, 1966). The Berry-Talbott Language Test of Comprehension of Grammar was selected in preference to the Berko because it included a greater number of complex items (a maximum of 26 in the Berry-Talbott as compared to ten in the Berko). Simple items were defined as those which required the addition of a single terminal phoneme, while complex items required the addition of a terminal syllable, an internal vowel shift, or formation of a compound word. Two items using real words were deleted, leaving 36 items, of which

between ten and 13 were simple and between 23 and 26 were complex. The range in the number of simple and complex items is due to the fact that based on the specific response, three items can be scored as either simple or complex, i.e., three items have both simple and complex correct responses. Item 17 requires the plural for geif. Applying the simple morphological rule for plural the response could be gelfs, as in roof - roofs and reef - reefs. By applying the complex morphological rule for plural the response could be gelves, as in leaf - leaves. Likewise, items 19 and 21 require the past tense for ling and bazing. Applying the simple morphological rule for past tense the responses could be linged and bazinged, as in wing - winged. By applying the complex morphological rule for the past tense the responses could be lang and bazang, as in sing - sang.

Corroboration for these alternate correct responses is found in examining the normative data. Forty four percent of the adults applied the simple morphological rules in items with alternative simple and complex correct responses.

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Based on the experimental findings of Berko in 1958 and 1961, on the morphological rules for regular and irregular inflections in English, and on an analysis of the responses of approximately 70 college students, a revised scoring key was devised (see Table 1). The original scoring guidelines did not include alternate simple and complex responses for items 17, 19, and 21 (Vogel, in press). Using the new key, the maximum simple subscore is 13, in which case the maximum complex subscore would be 23. The maximum complex subscore is 26, in which case the maximum simple subscore would be 10. The maximum total score is 36. The method of presentation is described below.

In this test the examiner shows the child a card on which there are one or more pictures of one or more imaginary animals depicting the desired response. Beneath the pictures is written what the examiner then reads to the child. The imaginary animal and/or his action is referred to by a nonsense word (e.g., wad, gish, fooz). The first sentence read to the child is complete, while in the second sentence a word is missing. The child then has to recall the nonsense word from the first sentence and inflect it, giving an oral response. These sentences were reread to the child upon request.

Morphology for Real Words

The second test selected was the Grammatic Closure subtest of the Illinois Test of Psycholinguistic Abilities (Kirk, McCarthy and Kirk, 1968). In this test the examiner describes two pictures orally. One sentence is complete while in the second a word is missing and has to be remembered from the first sentence, inflected, and then supplied by the subject. The items chosen were thought to be familiar enough so that the responses would be automatic. Since the semantic elements are provided by the examiner this test involves exposure, comprehension, memory and the use of morphological

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rules.

SAMPLE

General Criteria

The forty subjects in this study were drawn from 12 elementary schools in Evanston, Illinois. They were second grade males (not repeaters nor early entrants) between the ages of seven years, four months and eight years, five months. Hearing and vision were within normal limits. They were in good physical and emotional health. Semantic ability and intelligence were within normal limits and all children had adequate educational and experiential opportunity. All subjects spoke American Standard English, were monolingual, and were from families of similar socioeconomic status.

The above criteria were selected in order to control for differences in morphological ability which may be due to factors such as age, sex, dialectal or foreign language background, or emotional illness. The selection procedures, screening, and assessment as well as statistical analyses are described in greater detail by Vogel (In press).

The Dyslexic Group

The criteria for inclusion in the Dyslexic Group were based on our definition of dyslexia. Dyslexia was viewed as a specific type of learning disability and was defined as an inability to learn to read in the usual manner and at the expected age due to central nervous system dysfunction which is the result of developmental, constitutional, or pathological aberrations (Critchley, 1964; Hallgren, 1950; Johnson and Myklebust, 1967). Because the neurological dysfunction may or may not be demonstrable in each individual case, evidence of neurological dysfunction was not essential for inclusion in the Dyslexic Group. However, several other conditions had to be

met in addition to the primary presenting symptom of difficulty in learning to read and were therefore included in the general criteria, e.g., hearing and vision, physical and emotional health and intelligence all within normal limits. Thus children who were included in the Dyslexic Group had a deficit in reading despite normal mental, sensory, and emotional functioning, and had not been deprived of adequate cultural and educational opportunities.

Specific Criteris For Determining Group Membership

Two silent reading comprehension measures were selected as the criteria for determining group membership; The Gates-MacGinitie Reading Tests Primary B, Comprehension and Primary CS, Speed and Accuracy (Gates and MacGinitie, 1965).

Twenty dyslexics were identified who met all of the general criteria and for whom parental permission was granted. They had all scored one or more standard deviations below the mean on both the Gates-MacGinitie Reading Tests mentioned above. Each poor reader was matched within three months of his chronological age by a child who scored at the 50th percentile, or above on the two reading measures and met all general criteria.

RESULTS

Performance on the Morphology Tests

To determine if the poor readers were significantly different from the good readers in morphological ability the univariate F test was employed. The difference between the two sample groups on each of the two tests of morphology was significant at the .0005 level. Therefore, in answer to the major question posed, it was found that the dyslexics were inferior to the good readers in morphological ability as assessed by the Berry-Talbott Test and the Grammatic Closure Test. The means, standard deviations, and ranges of

the sample groups on these two tests are reported in Table 2.

A comparison of the mean scores of each group for the simple and complex subscores on the Berry-Talbott Test reveals an interesting difference (Table 3). The means of the simple subscores for the two sample groups were almost identical, while the difference between the means of the complex subscores was six points. In addition, the simple subscore means represented nearly a maximum score. In contrast, the complex subscore means were between ten and 15 points less than the maximum score. Apparently, the complex items accounted for most of the difference between the total score means (Table 2) and for the ability of this measure to differentiate between the sample groups.

Reliability

Because the reliability of the Berry-Talbott Test is not known, and to aid in the interpretation of the results, the reliability of these two measures was estimated by a two-way analysis of variance (Hoyt, 1941). According to this procedure, for every item, each child's response was analyzed and compared with his responses to all other items. An estimate of internal consistency, error, and the true variance yielded a reliability coefficient, the Hoyt r, of .68 for the Grammatic Closure Test and .89 for the Berry-Talbott Test.

The high reliability coefficient of the Berry-Talbott Test combined with the results of the univariate F test indicate that this measure in its present form appears to be a valuable research tool. Moreover, Vogel (1974) identified the Grammatic Closure Test as the best discriminator among nine psycholinguistic measures, while the Berry-Talbott Test was identified as the second best.

DISCUSSION

These findings indicate that the dyslexic children as compared to the good readers were significantly deficient in their ability to inflect real words and nonsense words involving the use of complex morphological rules. These findings thus confirm those of Hepburn (1968), Kass (1966), and Kirk, McCarthy and Kirk (1968) and the implications suggested by Brittain (1970) in her study.

Brittain (1970) also found that first and second graders did equally well on the 19 simple items in Berko's (1958) Test of Morphology, but that the second graders did better than the first graders on the ten complex items. Thus our findings confirm Brittain's.

Moreover, the complex subscore mean for the good readers was approximately nine points less than the maximum score. This finding contradicts Berry who states in the introduction to the test that eight year old children are expected to get almost all items correct (Berry, 1968). This was not found to be the case, not even for the good readers in this study (whose mean age was 7.9). These findings seem to indicate that the developmental curve for inflecting unknown words which require the use of complex morphological rules extends beyond the age eight. In fact, an analysis of responses of adults to the Berry-Talbott Test indicate that the ability to apply morphological rules to inflect unknown words varies even in mature language users. The infrequency of perfect scores in the adult population and the mean of 26.1 and range of 21-34 (Table 2) in second graders who are good readers are indications that this measure may be a sensitive instrument for assessing morphological ability in older children as well.

The novel drawings and words appealed to the children as well as to the

adults and most seemed to enjoy taking this test. If normative data were to be collected this measure could become a very useful diagnostic tool.

In its present form the Berry-Talbott Test could provide valuable clinical information. As an alternative to the scoring method based on the division of items into the two categories, simple and complex, the items could be divided into subgroups based on the morphological rules employed by the subject in formulating his response. In this way an individual's profile for internalized, emergent, and unknown morphological rules could be determined, and thus, provide useful information for the clinician or language therapist.

Limitations

We recognize that one of the limitations of this study is that one of the two measures selected was experimental, as was the scoring key. Therefore, the results must be considered suggestive rather than definitive.

Implications

The finding that children with reading comprehension difficulties were significantly different from the good readers in morphological ability, suggests that these children could be identified at an early age. Language instruction specifically designed to enhance morphological development could then ensue. Innovative programs for the purpose of identifying such children are now, in fact, being initiated. If morphological measures were incorporated into preschool screening batteries, children with linguistic deficiencies who may also be potentially reading disabled children might be identified and appropriate intervention implemented.

In addition, the evaluation of children with reading difficulties should include specific measures for assessing morphological ability.

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This study identified two useful measures. The availability of normative data, makes the Grammatic Closure Test a valuable clinical tool for screening and diagnostic purposes. Further refinement and standardization of the Berry-Talbott would make this measure also a valuable diagnostic instrument.

Teachers of reading should also be alert to the possibility that poor readers may not be utilizing to the fullest the semantic and syntactic clues provided in the morphology of written language because of immature or deficient development in this aspect of language. Using structural analysis in the teaching of reading may be an effective technique to call the child's attention to the information provided in these clues and thereby enhance reading comprehension and perhaps language development as well. This approach, along with oral language instruction, may have a reciprocal beneficial effect on morphological development and hopefully facilitate internalization of the morphological rules.

TABLE I

VOGEL'S REVISED SCORING KEY FOR BERRY-TALBOTT LANGUAGE TEST 1

COMPREHENSION OF GRAMMAR*

Plate	Item	Acceptable Responses	Simple	Complex
I	1.	nads	x	
II	2.	cubashes		x
III	3.	trommed	x	
IV	4.	lutzes		x
V	5.	flitched	x	
VI	6.	nadling, nadlet, naddle		x
VI	7.	nadhquse		x
VII	8.	goobs	x	
VIII	9.	troppy, tropped		x
IX	10.	gans	x	
X	11.	spuzzes		x
XI	12.	routed		x
XII	13.	dows	x	
XIII	14.	foozes		x
XIV	15.	howted		x
XV	16.	glshes		x
XVI	17.	gelfs	x	
		gelves		x
XVII	18.	tasses		x
XVIII	19.	lang		x
		linged	x	
XIX	20.	glzzles		x

VOGEL'S REVISED SCORING KEY FOR BERRY-TALBOTT LANGUAGE TEST

COMPREHENSION OF GRAMMAR (continued)

Plate	Item	Acceptable Responses	Simple	Complex
XX	21.	bazang		x
		bazinged	x	
XXI	22.	spuz's		x
XXI	23.	spuzzes'		x
XXIII	24.	nad's	x	
XXIII	25.	nads'	x	
XXIV	26.	troppier		x
XXIV	27.	troppiest		x
XXV	28.	glipping		x
XXV	29.	glipping gelf, glipper gelf glipper, glippergelf, glipgelf		x
XXVII	30.	dow's	x	
XXVII	31.	dows'	x	
XXVIII	32.	liggy, ligged		x
XXIX	33.	liggier		x
XXIX	34.	liggiest		x
XXX	35.	bining		x
XXX	36.	bining lutz, biner, lutz biner, binerlutz, binelutz		x

*Berry, M. and Talbott. Berry-Talbott Language Tests 1. Comprehension of Grammar. Rockford, Ill.: 1966.

TABLE 2

MEANS, STANDARD DEVIATIONS AND RANGES

OF MORPHOLOGY MEASURES

Measure	Group	Mean	SD	Range
Berry-Talbott Test (Total Score)	Good Readers	29.10	3.90	21-34
	Dyslexics	21.95	5.42	10-31
Grammatic Closure Test	Good Readers	28.55	2.11	25-32
	Dyslexics	24.75	3.04	19-33

TABLE 3

MEANS AND RANGES FOR SUBSCORES

OF THE BERRY-TALBOTT TEST

Berry-Talbott Subscore	Group	Mean	SD	Range
Simple Subscore (Maximum Score 13)	Good Readers	12.10	.89	10-13
	Dyslexics	10.70	2.28	6-13
Complex Subscore (Maximum Score 26)	Good Readers	17.00	3.56	9.21
	Dyslexics	11.35	4.11	3-19

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